The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A computer-implemented method for generating a reduced state space representation for a model in a compositional state system, the model comprising a selected set of components, each component comprising one or more states and one or more events, the model comprising interactions associated with events, the reduced state space representation being defined with respect to a set of events of interest selected from the events in the set of components, the method comprising the following steps:

   a. for each component in the set of components, ~~defining~~ generating a transitive effect machine data structure for the component such that the states of the transitive effect machine represent the states of the component and the events of the transitive effect machine represent the transitive effects of interactions associated with transitions of the component, the transitive effects being defined relative to the set of components, and the set of events of interest, and

   b. ~~reducing~~ selecting each of the ~~defined~~ generated transitive effect machine data structures, and for each selected transitive effect machine data structure, carrying out a computer-implemented reduction process on the selected transitive effect machine data structure to replace the selected transitive effect machine data structure with a reduced transitive effect machine data structure, each of the said reduction processes comprising the step of ~~the reduction including the classification of~~ classifying states within ~~a single~~the selected transitive effect machine to permit ~~a set of states in the said transitive effect machine to be grouped~~ grouping of states into a single class ~~when each state in the said set of states is characterized~~ defined by common properties of such states with respect to the set of events of interest.

2. (Original) The method of claim 1, in which the compositional state system supports labelled transition system models.

3. (Original) The method of claim 1, in which equivalent effects of transitive interactions for the transitions in the set of components are defined relative to a one of bisimulation or simulation equivalence.

4. (Original) The method of claim 1, in which equivalent effects of transitive interactions for the transitions in the set of components are defined relative to a one of observational equivalence or safety equivalence.

5. (Currently amended) The method of claim 1, in which the transitive effect machines data structures are represented by BDDs.

6. (Currently amended) The method of claim 1, comprising the further step of carrying out an expanding composition of the reduced state representation defined by the set of reduced transitive effect machines data structures.

7. (Original) The method of claim 1, comprising the further step of converting the reduced state representations to a labelled transition system representation.

8. (Currently amended) A computer implemented method for generation of a reduced state space representation of a model in a compositional state system, the model comprising a set of components, each component comprising one or more states and one or more events, the model comprising interactions associated with events, the reduced state space representation being defined with respect to a set of events of interest selected from the events in the set of components,

the method comprising the successive generation of a set of reduced transitive effect machines data structures relative to a set of successively defined assumed reduced components, each one of the reduced transitive effect machines data structures comprising classes and events and uniquely corresponding to a component in the set of components and each one of the assumed reduced components uniquely corresponding to a reduced transitive effect machine data structure and being derived from the corresponding component in the set of components and comprising a set of classes into which the states in the said component are grouped,
the generation of each reduced transitive effect machine data structure comprising the steps of

a. generating an intermediate transitive effect machine data structure comprising states and events, the states of the intermediate transitive effect machine data structure representing states of the component uniquely corresponding to the reduced transitive effect machine data structure and the events of the intermediate

transitive effect machine data structure representing one or more sets of equivalent effects of transitive interactions,

the equivalent effects of transitive interactions being defined for a pair of states in the component uniquely corresponding to the reduced transitive effect machine data structure, the defined equivalent effects being determined with reference to the set of successively defined assumed reduced components, where equivalent effects represent the transitive effects of interactions associated with each of the said pair of states, on a selected number of assumed reduction components, the transitive effects being defined with respect to the set of events of interest, and

b. generating the reduced transitive effect machine data structure by reducing the states in the intermediate transitive effect machine data structure to classes of states to define the classes in the reduced transitive effect machine data structure and by reducing the events in the intermediate transitive effect machine data structure to define the events in the reduced transitive effect machine data structure.

9. (Canceled)

10. (Currently amended) The method of claim 98 in which each defined assumed reduction component is initialized to a defined condition and in which the successive definitions of the assumed reduction component are derived from the corresponding reduced transitive effect machine data structure.

11. (Currently amended) The method of claim 98 in which a single step in the successive generation of reduced transitive effect machines data structures is terminated, and a further successive generation step is commenced, where the classes of a reduced transitive effect machine data structure defined in the single successive generation step are not consistent with the classes in the corresponding assumed reduction component.

12. (Original) The method of claim 11 in which the initialization of each assumed reduced component comprises the step of defining each class in the assumed reduced component to include all states in the corresponding component in the state of components.

13. (Currently amended) The method of claim 12 in which each step in the successive redefinition of the assumed reduced components comprises defining the classes in each assumed reduced component to be equivalent to the classes in the previously generated corresponding reduced transitive effect machine data structure.

14. (Currently amended) The method of claim 98 in which the equivalent effects of transitive interactions for each transition in a component are defined with respect to each of the non-corresponding assumed reduced components.

15. (Currently amended) The method of claim 98 in which the equivalent effects of transitive interactions for each transition in the component are defined with respect to defined subsets of the non-corresponding assumed reduced condition.

16. (Currently amended) The method of claim 98 in which the equivalent effects of transitive interactions for the corresponding component are merged prior to defining each intermediate reduced transitive effects machine data structure.

17. (Currently amended) The method of claim 98 in which the order of generation of intermediate reduced transitive effect machines data structures is arranged in one or more of the following ways

i. the generation of intermediate transitive effect machines data structures uses the assumed reduced component corresponding to the most recently defined reduced transitive effect machines data structures;

ii. a sequential selection of assumed reduced components for use in determining equivalent effects is arranged from the assumed reduced component with fewest classes to the assumed reduced component with most classes; and

iii. the generation of defined sets of intermediate reduced transitive effect machines data structures is carried out in parallel.

18. (Currently amended) The method of claim 98, in which the compositional state system supports labelled transition system models.

19. (Currently amended) The method of claim ~~9~~8, in which equivalent effects of transitive interactions for the transitions in the set of components are defined relative to a one of bisimulation or simulation equivalence.

20. (Currently amended) The method of claim ~~9~~8, in which equivalent effects of transitive interactions for the transitions in the set of components are defined relative to a one of observational equivalence or safety equivalence.

21. (Currently amended) The method of claim ~~9~~8, in which transitive effect machines data structures are represented by BDDs.

22. (Currently amended) The method of claim ~~9~~8, comprising the further step of composing the reduced state representation defined by the set of reduced transitive effect machines data structures.

23. (Currently amended) The method of claim ~~9~~8, comprising the further step of converting the composed reduced state representation to an labelled transition system representation.

24. (Currently amended) A computer implemented method for generating a test sequence for a system, the system being represented by a model having states and events, the method comprising the following steps:

i. composing the model and a test representation to generate a composed test model, the test representation comprising states and events defining a set of test requirements, and comprising one or more acceptance events,

ii. defining a set of transitive effect machines data structures by carrying out the method of claim 1 with respect to the composed test model and a set of events of interest, the set of events of interest comprising one or more of the acceptance events,

iii. defining an input data set for a test sequence generator using the set of transitive effect machines data structures, and

iv. obtaining the test sequence by running the test sequence generator on the input data set.

25. (Currently amended) A computer implemented method for generating a test sequence for a system, the system being represented by a model having states and events, the method comprising the following steps:

i. composing the model and a test representation to generate a composed test model, the test representation comprising states and events defining a set of test requirements, and comprising one or more acceptance events,

ii. defining a set of transitive effect machine data structures by carrying out the method of claim 8 with respect to the composed test model and a set of events of interest, the set of events of interest comprising one or more of the acceptance events,

iii. defining an input data set for a test sequence generator using the set of transitive effect machines data structures, and

iv. obtaining the test sequence by running the test sequence generator on the input data set.

26. (Currently amended) A computer implemented method for generating a test sequence for a system, the system being represented by a model having states and events, the method comprising the following steps:

i. defining a set of events of interest,

ii. composing the model and a test representation to generate a first composed test model, the test representation comprising states and events defining a set of test requirements, and comprising one or more acceptance events,

iii. defining successive sets of transitive effect machines data structures by carrying out the method of claim 1 with respect to successively defined composed test models and successively defined subsets of the set of events of interest, the said subset comprising one or more of the acceptance events, the successive definition of composed test models comprising the composition of the first test model with the output of a previously defined interim test sequence,

iv. defining input data sets for a test sequence generator using the successive sets of transitive effect machines data structures,

v. obtaining a series of interim test sequences by running the test sequence generator on the input data sets, and

vi. defining the test sequence by running the test sequence generator on the series of interim test sequences.

27. (Currently amended) A computer implemented method for generating a test sequence for a system, the system being represented by a model having states and events, the method comprising the following steps:

i. defining a set of events of interest,

ii. composing the model and a test representation to generate a first composed test model, the test representation comprising states and events defining a set of test requirements, and comprising one or more acceptance events,

iii. defining successive sets of transitive effect machines data structures by carrying out the method of claim 8 with respect to successively defined composed test models and successively defined subsets of the set of events of interest, the said subset comprising one or more of the acceptance events, the successive definition of composed test models comprising the composition of the first test model with the output of a previously defined interim test sequence,

iv. defining input data sets for a test sequence generator using the successive sets of transitive effect machines data structures,

v. obtaining a series of interim test sequences by running the test sequence generator on the input data sets, and

vi. defining the test sequence by running the test sequence generator on the series of interim test sequences.

28. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 1.

29. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 8.

30. (Canceled)

31. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 10.

32. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 11.

33. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 12.

34. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 13.

35. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 24.

36. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 25.

37. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 26.

38. (Original) A computer program product comprising a computer usable medium tangibly embodying computer readable program code for carrying out the method of claim 27.

39. (Canceled)

40. (Canceled)

41. (Canceled)

42. (Canceled)

43. (Canceled)

44. (Canceled)